

IMPACT OF PLA MATRIX VISCOSITY ON PLA/PCL BLENDS

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PLA/PCL (80/20) blends with different components viscosity ratio ($PCL \approx PLA1 > PLA2 > PLA3$) were prepared, using optimized composition and processing conditions [1, 2]. The morphology of all samples was examined in detail by scanning electron microscopy in order to describe an influence of the viscosity on the particle size distribution and, consequently, on the blend toughness. The fracture behavior of the blends was studied by non-instrumented and instrumented impact testing, and the extreme sensitivity of the PLA/PCL toughness on the phase was confirmed.

The phase structure development showed that the average PCL particle size increased with decreasing of matrix viscosity. PLA1/PCL blends exhibited fine morphology, PLA2/PCL contained bigger particles, and PLA3/PCL (Fig.1) had the biggest particles and very broad size distribution. The viscosity-induced increase in particle size significantly decreased the impact strength and fracture behavior, which changed from elastic-plastic stable fracture (PLA1/PCL), through the stable fracture followed by unstable crack propagation (PLA2/PCL), to the completely brittle fracture (PLA3/PCL).

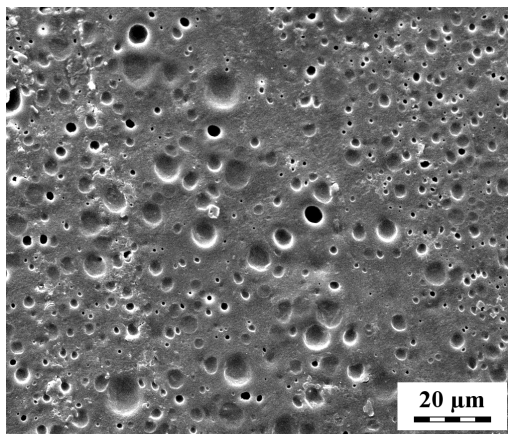


Fig.1 SEM/SE micrograph of smoothed and etched compression molded sample PLA3/PCL=80/20 with very broad overall particle size distribution.

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[1] A. Ostafinska et al., *J. Mech. Behav. Biomed. Mater.*, 2017, 69, 229.

[2] A. Ostafinska et al. 2015, *RSC Adv.* 5, 98971.